A new model of implant-related osteomyelitis in rats.

Abstract:
Infection related to osteosynthesis often has dramatic consequences for the patient. Prolonged hospitalization with systemic antibiotic therapy, several revision procedures, possible amputation, and even death may occur. To investigate the pathology of infection in orthopedic surgery, a new rat model of implant related osteomyelitis was developed. Three different concentrations \((10^6), (10^3), \) and \(10^2\) colony-forming units (CFU)/10 microl of Staphylococcus aureus were inoculated into the tibial medullary cavity with simultaneous insertion of a titanium Kirschner wire. Controls received phosphate-buffered saline (PBS). Each group consisted of 10 animals. Animals were followed for 4 weeks until sacrifice. X-rays of the tibiae were taken weekly, blood counts were analyzed, and body temperature and weight were determined. After sacrifice, infection was evaluated by histological and microbiological investigations. All animals inoculated with Staph. aureus in either concentration developed microbiological, histological, and radiological signs of osteomyelitis in correlation to the amount of inoculated bacteria. X-rays clearly revealed osseous destruction after 14 days with progression of osteomyelitis during the following weeks. CFU/g bone and bone weight after sacrifice showed dependence on the amount of inoculated CFU. The histological results confirmed the radiological findings. No significant changes in blood counts, body weight, and body...
temperature between the groups could be observed. The results demonstrate that it is possible to develop a model of implant-related osteomyelitis in rats with dependence on the amount of inoculated bacteria. No other promoters of infection besides intramedullary insertion of titanium Kirschner wires were used in this model.

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